

Steps in Risk Assessment:

4. Risk Characterization:

Health risk assessments are based on the relationship between risk, dose, and toxicity:

$$Risk = Dose * Toxicity$$

Since dose is the product of the contaminant concentration multiplied by exposure (the intake), equation (1) becomes:

$$Risk = Intake\ rate * Contaminant\ conc. * Toxicity$$

To estimate the intake, the exposure equations and assumptions are used. The intake estimates for each route of exposure are then combined with the RfDs or SFs to determine the resulting risk.

For Carcinogens Risk:

$$\begin{aligned} Cancer\ Risk = & (Dermal\ Slope\ Factor \times Dermal\ Absorbed\ Dose) + \\ & (Oral\ Slope\ Factor \times Chronic\ Daily\ Intake) + \\ & (Inhalation\ Unit\ Risk \times Exposure\ Concentration) \end{aligned}$$

where, taking into account all COCs and relevant exposure pathways, the acceptable excess cancer risk is below 10^{-4} .

For Noncarcinogens:

$$\begin{aligned} Hazard\ Index = & (Dermal\ Absorbed\ Dose / Dermal\ RfD) + (Chronic\ Daily\ Intake / Oral\ RfD) \\ & + (Exposure\ Concentration / RfC) \end{aligned}$$

where, taking into account all COCs and relevant exposure pathways, the acceptable hazard index is below 1.

The facility will use the Virginia DEQ 's [VURAM](#) and [VURAM User's Guide](#) as well as applicable EPA guidance documents to perform quantitative risk assessments. The cumulative risk/hazard from all constituents of concern (carcinogenic and non-carcinogenic) for residential child and adult receptor should be included.

The results of the risk assessment are provided in VURAM report (output). Please submit this report in its ENTIRETY. Incomplete submissions will result in delay of risk assessment based decision-making. The risk assessment may be conducted with the following options of data-grouping:

1. For each unit or group of units, the cumulative risk from all constituents of concern in all media for residential child receptor, residential adult receptor, and/or industrial adult receptor, carcinogenic and non-carcinogenic; OR
2. For the entire site, the cumulative risk from all constituents of concern in all media for residential child receptor, residential adult receptor, and/or industrial adult receptor, carcinogenic and non-carcinogenic;
3. The contribution of each constituent in each medium to the cumulative risk;
4. If applicable, a characterization of risk to ecological receptors.